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Abstract Title:	**Digital 3D Reconstruction of Human Orbitae From High Resolution Serial Sections**
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Author Block:	*J.van Zwieten[1], C.P. Botha[1], B.Willekens[2], S.Schutte[1], F.H. Post[1], H.J. Simonsz[3].* [1]Delft University of Technology, Delft, The Netherlands; [2]Netherlands Ophthalmic Research Institute, Amsterdam, The Netherlands; [3]Ophthalmology, Erasmus Medical Center, Rotterdam, The Netherlands.
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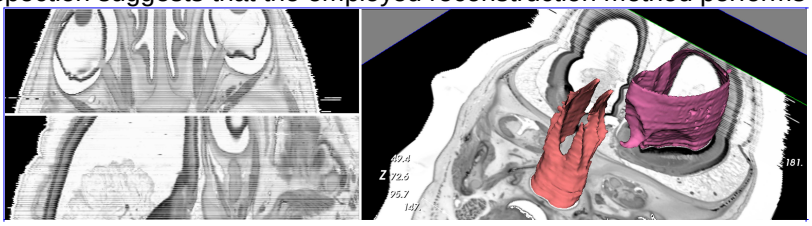
Purpose:
To develop methods for the digital 3D reconstruction of the heads of a series of human embryos (13 - 63mm) and the orbits of two adults from 2000 celloidine sections (Koornneef 1976). The reconstructions, publicly available via the Internet, will allow researchers to explore the orbital anatomy in 3D, which provides a clear view on the spatial organisation of structures within the orbit.
Methods:
The sections were digitized at 2500 dpi, which yielded about 200 MB of raw data per section. We implemented an automatic segmentation method to separate the object from the background, followed by conversion to gray scale. Reconstruction was accomplished through pairwise image registration using normalized correlation as a similarity measure. Only rigid transformations were considered during reconstruction. To speed up computation the sections were subsampled. Application of the resultant transformation to the high resolution images is straight-forward.
Results:
A subvolume consisting of one hundred sections from the 63mm embryonic series has been reconstructed as a proof of concept. Visual inspection suggests that the employed reconstruction method performs very well on the type of sections available to us.



Conclusions:
Non-affine reconstruction (*'unwarping'*) proved unnecessary to produce high quality 3D reconstructions from these sections. Deformation introduced by celloidine embedding and decalcification with EDTA, performed thirty years ago, seems minimal.

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